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As a below named translator, I hereby declare that:

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I hereby certify that I am conversant with both the English and Korean language and the enclosed herewith is a true and accurate English translation of the Korean patent document(s) KR 10-2001-0039120 and KR 10-2002-0027801.

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(54) TITLE OF THE INVENTION:

RADIATION APPARATUS FOR PLASMA DISPLAY DEVICE

【ABSTRACT OF THE DISCLOSURE】

【Abstract】

A plasma display panel (PDP) according to an exemplary embodiment of the present invention includes a panel for displaying an image by gas discharges therein, and an electronic cooling device using one of a Peltier effect and a Thomson effect to absorb the heat around the panel. A plurality of electronic cooling devices are coupled on a rear surface of the panel and are provided to a heat dissipating plate for absorbing the heat generated while the PDP is driven. Therefore, since a heat dissipating fan, which causes power consumption and noise, and an electron cooling method are used to dissipate the heat generated form the panel, heat dissipating efficiency may be maximized, and weight and thickness of the PDP may be reduced.

【Representative Drawing】

Representative drawing: FIG. 4

【Key Word】

PDP, heat dissipation, Peltier, Thomson

【SPECIFICATION】

【BRIEF DESCRIPTION OF THE DRAWINGS】

FIG. 1 shows an exploded perspective view of a heat dissipating unit of a conventional display panel (PDP).

FIG. 2 shows a cross sectional view of the conventional PDP.

FIG. 3 shows a diagram representing a heat dissipation state when a heat dissipating plate according to an exemplary embodiment of the present invention is used.

FIG. 4 shows a diagram of a configuration of a heat dissipating unit according to an exemplary embodiment of the present invention (a cross-section along line a-a' in FIG. 3).

FIG. 5 shows a circuit diagram of a heat dissipating unit according to another exemplary embodiment of the present invention.

FIG. 6 shows a cross-sectional view of a PDP according to the exemplary embodiment of the present invention.

* Description of Reference Numerals Indicating Primary Elements in the Drawings *

1: Panel

2, 4: Thermal Conductivity Sheets

3: Heat Dissipating Plate

5: Front Case

6: Rear Case

7: Heat Dissipating Fan

13: Thermoelectric Element

【DETAILED DESCRIPTION OF THE INVENTION】

【OBJECT OF THE INVENTION】

【FIELD OF THE INVENTION AND DESCRIPTION OF THE RELATED ART】

In general, a plasma display panel (PDP) is a display device that displays an image by using gas discharges in two glass substrates in a vacuum therein. Since it is not required to provide active elements to each cell, a manufacturing process is simplified, it is easy to be used for a large screen, and a response speed is fast, and so the PDP is used for direct view image display devices having a large screen, particularly, image display devices for high definition television (HDTV) (e.g., a television, a monitor, and an indoor/outdoor advertisement display element), and it is used for display elements having a large screen of 40 to 60 inches.

However, since heat at a high temperature is generated by gas discharges while operating the PDP, it is required to quickly dissipate the heat so that the PDP is stably driven and the life-span thereof may be increased.

Accordingly, a heat dissipating device using a fan is provided to a rear part of the PDP in a like manner of other electron products so that the heat generated from the inside of the panel may be dissipated.

FIG. 1 and FIG. 2 show diagrams representing cooling devices of a conventional PDP.

As shown in FIG. 1 and FIG. 2, a panel unit 1 is formed by a thin glass substrate, an image is displayed by a gas discharge in a vacuum space in the thin glass substrate, a heat dissipating plate 3 is provided on a rear surface of the panel unit 1, a plurality of heat dissipating fans 7 for artificially convecting a heat generated from the panel unit 1 to the open air when the PDP is driven are provided to a rear surface of the heat dissipating plate 3.

A front case 5 and a rear case 6 form the external shape.

The heat dissipating plate 3 includes an aluminum material of high thermal conductivity, the panel unit 1 is protected by providing thermal conductivity sheets 2 and 4 between the rear surface of the panel unit 1 and the heat dissipating plate 3, the heat dissipating plate 3 of a metallic material is provided to the rear surface of the panel unit 1 of a glass material, and the heat generated from the panel unit 1 is easily conducted from the thermal conductivity sheets 2 and 4 to the heat dissipating plate 3.

When the PDP in the above configuration is driven, heat is generated by the gas discharge in the panel unit 1, is conducted to the heat dissipating plate 3 on the rear surface of the panel unit 1, and is then dissipated by artificially convecting to the outside air by the heat dissipating fan 7 and by naturally convecting to the outside air through the front surface of the panel.

That is, the heat generated from the panel unit 1 is dissipated through two main paths; a first path Ⅰ where the heat is conducted through the panel unit 1 and is convected to the outside air and radiated from the front surface of the panel unit 1, and a second path Ⅱ where the heat is conducted from the

panel unit 1 to the thermal conductivity sheet 4 and the heat dissipating plate 2 through the rear surface of the panel unit 1 and is artificially convected from a surface of the heat dissipating plate 3 to the outside air by the heat dissipating fan 3.

However, since an image is displayed on the front surface of the panel unit 1 and a temperature may not be artificially controlled on the front surface, the second path Ⅱ is the main path for dissipating the heat in the PDP.

Accordingly, the heat dissipating plate 3 having the aluminum material of good thermal conductivity is provided on the rear surface of the panel unit 1 and an artificial convecting method by using the heat dissipating fan 7 is used to perform quick heat dissipation.

Since the heat generated in the panel unit may be quickly dissipated to the exterior while the PDP is driven, the PDP may be stably driven and the life-span thereof may be increased.

The heat is equally dissipated through the panel unit according to a heat dissipating method of the PDP according to the prior art, but a desired heat dissipating level may not be achieved. A temperature of the panel unit is at a high level of 40 to 50° C when the PDP is driven.

Accordingly, when the PDP is driven for a long time, image realizing components including phosphor and electrodes are deteriorated, a clear image may not be provided, and an explosion may occur due to over-heating.

In addition, since it is required to continuously operate the heat dissipating fan to dissipate the heat from the panel while the PDP is driven, power consumption and noise are problematically increased.

The PDP is now famous for a wall-mounted television, and accordingly,

a light weight and a thin thickness are required. However, since the heat dissipating fan is used as described above, there is a limit for reducing the weight and the thickness of the PDP.

Accordingly, it is required to use another heat dissipating device for achieving the same effects as the heat dissipating fan without using the heat dissipating fan in the PDP.

【OBJECT TO BE ACHIEVED BY THE PRESENT INVENTION】

The present invention has been made in an effort to solve the above-described problem, and it is an object of the present invention to provide a heat dissipating device of a plasma display panel (PDP) for maximizing a heat dissipation.

In addition, it is another object of the present invention to improve reliability of the PDP. The reliability is increased since the power consumption and noise problems are solved by eliminating the heat dissipating fan and so weight and thickness of the PDP can be accordingly reduced.

A heat dissipating device according to an exemplary embodiment of the present invention includes a panel for displaying an image by gas discharges therein, a heat dissipating plate coupled on a rear surface of the panel to absorb the heat generated while the PDP is driven, and a thermoelectric semiconductor formed by coupled n/p thermoelectric semiconductors to absorb the heat around the panel.

That is, heat absorption and heat dissipation are performed by using the Peltier effect in which the heat is generated or absorbed in proportion to flowing currents, in addition to Joul heat when the currents flow, while two different

types of metals are coupled.

The above heat effect is reversible, and the heat absorption and generation are opposite when a current direction is reversed.

When two thin metallic materials are coupled and a power source is applied according to the exemplary embodiment of the present invention, noise and thickness caused by the conventional heat dissipating fan may be reduced.

In addition, a heat dissipating device according to another exemplary embodiment of the present invention includes a panel for displaying an image by gas discharges therein, a heat dissipating plate coupled on a rear surface of the panel to absorb a heat generated while the PDP is driven, and a thermal conductor driven by receiving direct currents (DC) and formed by welding two different metals to absorb the heat around the panel.

That is, a heat dissipation is performed by using the Thomson effect, in which the heat is generated or absorbed in proportion to currents and a temperature gradient when there is a temperature difference between two nodes of the two different metals and the currents flow to the nodes.

Accordingly, the above heat dissipating device is easy to be established, and a cooling effect may be easily achieved by controlling the number of the heat dissipating devices and an applied power source.

【Constitution and Operation of the Invention】

In the following detailed description, only certain exemplary embodiments of the present invention have been shown and described, simply by way of illustration.

The drawings and description are to be regarded as illustrative in nature

and not restrictive. Like reference numerals designate like elements throughout the specification.

FIG. 3 shows a diagram representing one of a plurality of thermoelectric elements 13 provided on a heat dissipating plate 3 according to an exemplary embodiment of the present invention, and FIG. 4 shows a detailed diagram of a cross-section along line a-a' of the thermoelectric element 13 shown in FIG. 3.

As shown in the cross-section in FIG. 4, the thermoelectric element 13 according to the exemplary embodiment of the present invention applies a direct current (DC) power source after electrically coupling n/p type thermoelectric semiconductors in series. For example, thermoelectric semiconductors Bi_2Te3 (13a) and Sb_2Se (13b) are coupled and used as a module.

That is, when DC currents flow, a temperature difference occurs on both surfaces of the module by a thermoelectric effect. Accordingly, heat absorption occurs at a node between the thermoelectric semiconductors 13a and 13b since electrons absorbing heat energy are transmitted to an inside of the thermoelectric semiconductor, and the heat is generated at an opposite side node since the heat energy of the electron is dissipated.

In this case, a cooling function may be performed since the heat is absorbed from the panel unit 1 by using the heat absorption effect according to the exemplary embodiment of the present invention.

In the thermoelectric element 13 according to another exemplary embodiment of the present invention as shown in FIG. 5, when the DC currents flow while iron and copper wires A and B are connected to each other and a closed circuit is formed, a high temperature part is formed at a node T_H where a

power source inflows from B due to a potential difference caused by a temperature gradient that occurs between the metals, and a low temperature part is formed at another node T_C.

In this case, the low temperature part T_C is positioned on a panel side of the heat dissipating plate 3, the high temperature part T_H is positioned on the opposite side of the low temperature part T_C, and therefore the cooling function of the panel unit 1 may be performed.

The above cooling method that has been disclosed is the Thomson effect, and therefore, a detailed description thereof will be omitted.

When an electron cooling device according to the exemplary embodiment of the present invention is used, heat dissipation efficiency may be easily controlled. In addition, since the thickness of the PDP is reduced by $\triangle D$ compared to when the heat dissipating fan is used, the thickness of D' can be maintained.

While this invention has been described in connection with what is presently considered to be practical exemplary embodiments, it is to be understood that the invention is not limited to the disclosed embodiments, but, on the contrary, is intended to cover various modifications and equivalent arrangements included within the spirit and scope of the appended claims.

【EFFECT OF THE INVENTION】

As described above, since a light and small heat dissipating device using an electron cooling principle is provided according to the exemplary embodiment of the present invention, a heat generated while the PDP is driven is reduced, and therefore, heat dissipation efficiency may be maximized.

In addition, since an electron cooling device is used rather than a heat dissipating fan, power consumption and noise problems may be solved, and weight and thickness of the PDP may be reduced.

(57) 【CLAIMS】

【Claim 1】

A heat dissipating device in a plasma display device, the heat dissipating device comprising:

a plasma display panel (PDP) for displaying an image by gas discharges therein; and

an electronic cooling device using one of a Peltier effect and a Thomson effect to absorb heat around the PDP.

【Claim 2】

The heat dissipating device of claim 1, wherein a plurality of electronic cooling devices are coupled on a rear surface of the PDP and are provided on a heat dissipating plate for absorbing the heat generated while the PDP is driven.

【Claim 3】

A heat dissipating device in a plasma display device, the heat dissipating device comprising:

a plasma display panel (PDP) for displaying an image by gas discharges therein; and

a thermoelectric semiconductor formed by coupled n/p thermoelectric

semiconductors to absorb heat around the PDP.

【Claim 4】

The heat dissipating device of claim 3, wherein a plurality of thermoelectric semiconductors are coupled on a rear surface of the PDP, are provided on a heat dissipating plate for absorbing the heat generated while the PDP is driven, and are driven by receiving direct currents.

【Claim 5】

A heat dissipating device in a plasma display panel (PDP) for displaying an image by gas discharges therein, the heat dissipating device comprising

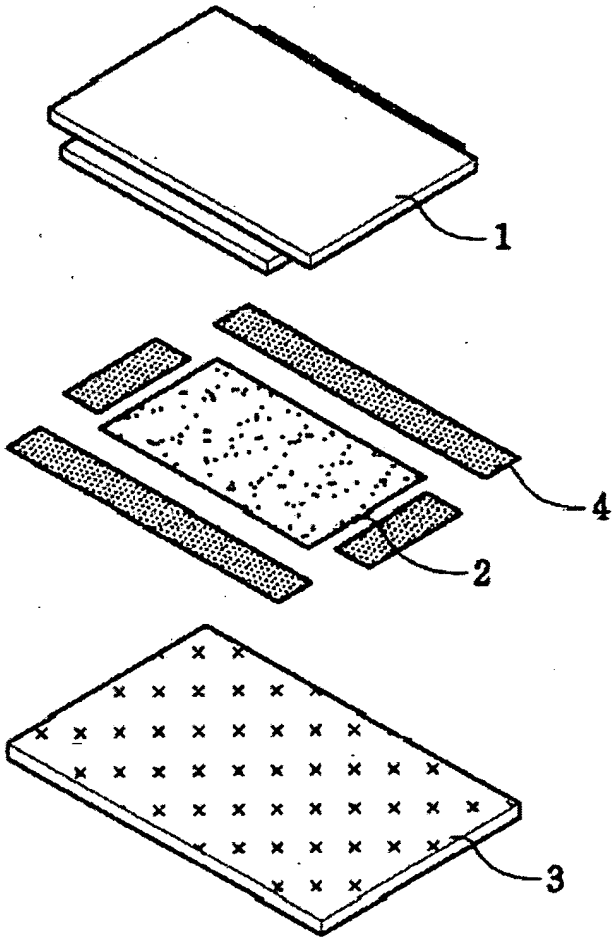
a thermal conductor formed by welding two different metals to form a circuit that receives direct currents to absorb heat around the PDP.

【Claim 6】

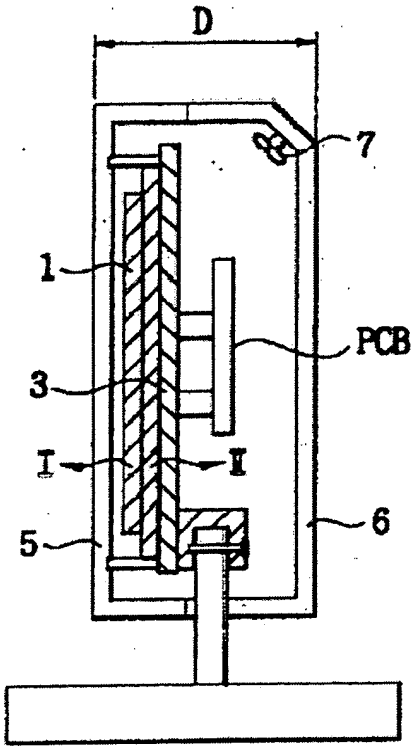
The heat dissipating device of claim 5, wherein a plurality of thermal conductors are coupled on a rear surface of the PDP, are provided on a heat dissipating plate for absorbing the heat generated while the PDP is driven.

【DRAWINGS】

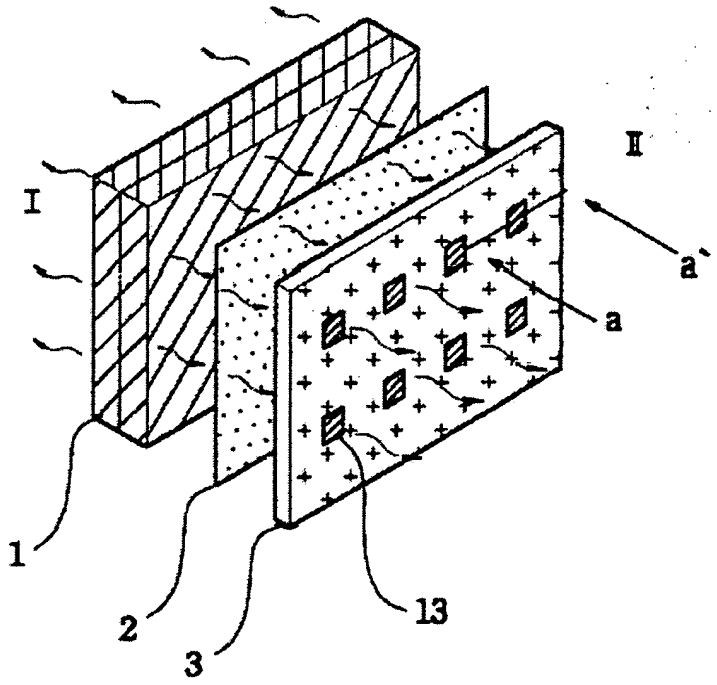
【FIG. 1】



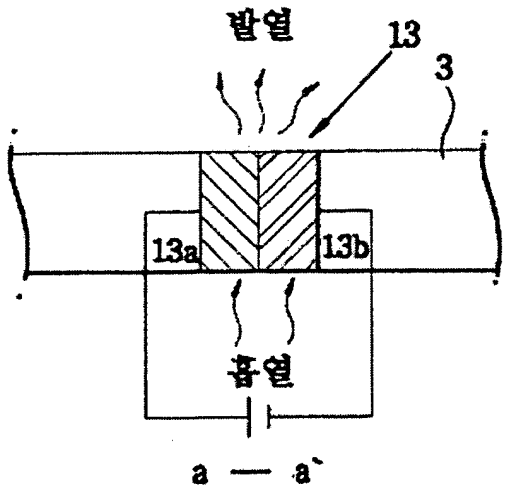
【FIG. 2】



【FIG. 3】



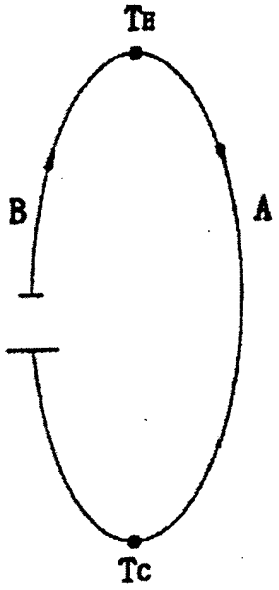
【FIG. 4】



발열: Heat Dissipation

흡열: Heat Absorption

【FIG. 5】



【FIG. 6】